6U3023

13701.pje

A METHOD FOR RECOVERING 3D SCENE STRUCTURE AND CAMERA MOTION FROM POINTS, LINES AND/OR DIRECTLY FROM THE IMAGE INTENSITIES

ABSTRACT OF THE INVENTION

An algorithm for recovering structure and motion from points, lines and/or image intensities. The algorithm combines feature based reconstruction and direct methods. The present invention is directed to a method for recovering 3D scene structure and camera motion from image data obtained from a multi-image sequence, wherein a reference image of the sequence is taken by a camera at a reference perspective and one or more successive images of the sequence are taken at one or more successive different perspectives by translating and/or rotating the camera. The method comprising the steps of (a) determining image data shifts for each successive image with respect to the reference image; the shifts being derived from the camera translation and/or rotation from the reference perspective to the successive different perspectives; (b) constructing a shift data matrix that incorporates the image data shifts for each image; (c) calculating two rank-3 factor matrices from the shift data matrix using SVD, one rank-3 factor matrix corresponding the 3D structure and the other rank-3 factor matrix corresponding the camera motion; (d) recovering the 3D structure from the 3D structure matrix using SVD by solving a linear equation; and (e) recovering the camera motion from the camera motion matrix using the recovered 3D structure.